

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A fire extinguisher, comprising:
a container containing a propellant and a fluid fire suppressant, wherein the propellant is functional to propel the fluid fire suppressant from the container; and
a surfactant in the fluid fire suppressant to enhance the film-forming capability of the fluid fire suppressant on a fuel.
2. The fire extinguisher of Claim 1, wherein the surfactant increases the miscibility of the fluid fire suppressant with a fuel.
3. The fire extinguisher of Claim 1, wherein the fuel is gasoline.
4. The fire extinguisher of Claim 1, wherein the fire suppressant comprises a water-based fluid fire suppressant.
5. The fire extinguisher of Claim 1, wherein the fire suppressant comprises an anti-freeze composition.
6. The fire extinguisher of Claim 5, wherein the anti-freeze comprises at least one of ethylene glycol or propylene glycol.
7. The fire extinguisher of Claim 5, wherein the anti-freeze comprises a salt selected from at least one of potassium acetate, calcium chloride, potassium lactate or ammonium acetate or combinations thereof.
8. The fire extinguisher of Claim 1, wherein the fire suppressant comprises a perfluorocarbon or hydrofluorocarbon or combinations thereof.
9. The fire extinguisher of Claim 1, wherein the fire suppressant comprises a fluorocarbon selected from at least one of heptafluoropropane, hexafluoropropane, pentafluoropentane or combinations thereof.
10. The fire extinguisher of Claim 1, wherein the fire suppressant comprises a fluoroketone.

11. The fire extinguisher of Claim 1, wherein the fire suppressant comprises perfluorbutyl trifluormethyl ketone.
12. The fire extinguisher of Claim 1, wherein the fire suppressant comprises water and potassium acetate.
13. The fire extinguisher of Claim 1, wherein the propellant is a solid, liquid or gas.
14. The fire extinguisher of Claim 1, wherein the propellant produces at least carbon dioxide, water and nitrogen.
15. The fire extinguisher of Claim 1, wherein the propellant comprises a nitrogen-containing fuel, an oxidizer, and a coolant.
16. The fire extinguisher of Claim 15, wherein the nitrogen-containing fuel comprises at least one of an aminotetrazole, 5-amino-tetrazole and the potassium salt thereof, guanidine nitrate, aminoguanidine nitrate, triaminoguanidinium nitrate, nitroguanidine, ammonium nitrate, dicyanodiamide, oxamide and combinations thereof.
17. The fire extinguisher of Claim 15, wherein the oxidizer comprises at least one of ammonium, sodium, potassium and/or strontium nitrates; ammonium and/or potassium perchlorates; ceric ammonium nitrate and combinations thereof.
18. The fire extinguisher of Claim 15, wherein the coolant comprises at least one of magnesium carbonate, magnesium hydroxide, magnesium hydroxide carbonate, aluminum hydroxide and combinations thereof.
19. The fire extinguisher of Claim 1, wherein the propellant comprises 5-aminotetrazole, strontium nitrate, and magnesium carbonate.
20. The fire extinguisher of Claim 1, wherein the propellant comprises an additive that increases fire suppression.
21. The fire extinguisher of Claim 20, wherein the additive comprises at least one of a potassium salt, sodium salt and combinations thereof.

22. The fire extinguisher of Claim 20, wherein the additive comprises at least one of a halide, bromide, carbonate, hydrogen carbonate, iodide and combinations thereof.

23. The fire extinguisher of Claim 1, wherein the surfactant comprises an alkyl sulfonate.

24. The fire extinguisher of Claim 1, wherein the surfactant comprises an amine salt.

25. The fire extinguisher of Claim 1, wherein the surfactant comprises a mixture of a fluorocarbon and/or hydrocarbon surfactants with alkyl polyglycosides and/or glycols.

26. A fire suppression system for a vehicle, comprising:
a fire extinguisher according to Claim 1;
an instrument capable of indicating a condition selected from the group consisting of acceleration, deceleration, speed, time, temperature, fuel, fuel level, fire, smoke, light transmittance and optical signature; and
a processor to activate the fire extinguisher based on an indication of one or more conditions.

27. The fire suppression system of Claim 26, further comprising distribution pipes connected to the fire extinguisher container to deliver the fluid fire suppressant to nozzles placed in locations to discharge on a fuel spill.

28. The fire suppression system of Claim 26, further comprising distribution pipes connected to the fire extinguisher container to deliver the fluid fire suppressant to telescoping nozzles, wherein the telescoping nozzles are withdrawn in the distribution pipes and telescope to deliver the fluid fire suppressant.

29. The fire suppression system of Claim 26, wherein the instrument comprises an acceleration or deceleration sensor and a timer, and the processor activates the fire extinguisher according to at least an acceleration or deceleration condition indicative of a collision and a time delay after the acceleration or deceleration condition.

30. The fire suppression system of Claim 26, wherein the instrument comprises an acceleration or deceleration sensor and a temperature sensor, and the processor activates the fire extinguisher according to at least an acceleration or deceleration condition indicative of a collision and a temperature condition indicative of a fire.

31. The fire suppression system of Claim 26, wherein the instrument comprises an acceleration or deceleration sensor and a smoke sensor, and the processor activates the fire extinguisher according to at least an acceleration or deceleration condition indicative of a collision and a smoke condition indicative of a fire.

32. The fire suppression system of Claim 26, wherein the instrument comprises an acceleration or deceleration sensor and a speed sensor, and the processor activates the fire extinguisher according to at least an acceleration or deceleration condition indicative of a collision and a speed condition indicative of the vehicle slowing down.

33. The fire suppression system of Claim 26, wherein the instrument comprises a speed sensor and the processor activates the fire extinguisher according to a speed condition that is indicative of the vehicle stopping.

34. The fire suppression system of Claim 26, wherein the instrument comprises a speed sensor and the processor activates the fire extinguisher according to a speed condition that is indicative of the vehicle slowing down.

35. The fire suppression system of Claim 26, further comprising a manual activate switch that activates the fire suppression system even if the instrument is indicating a condition that would otherwise not cause activation.

36. The fire suppression system of Claim 26, wherein the processor activates the fire suppression system on any two conditions from an instrument selected from the group consisting of an acceleration sensor, deceleration sensor, speed sensor, timer, temperature sensor, fuel sensor, fuel level sensor, fire sensor and smoke sensor.

37. The fire suppression system of Claim 26, wherein the instrument comprises an acceleration or deceleration sensor, a speed sensor, and a timer, and the processor activates the fire suppression system provided the vehicle has reached a minimum speed condition, and the time delay after an acceleration or deceleration condition indicative of a collision is adjusted according to the speed that is in excess of the minimum speed at the time of collision.

38. The fire suppression system of Claim 26, wherein the instrument comprises an acceleration or deceleration sensor and a fuel sensor, and the processor activates the fire suppression system according to a condition of acceleration or deceleration indicative of a collision and on a condition of fuel being detected that is indicative of a fuel spill.

39. The fire suppression system of Claim 26, wherein the instrument comprises an acceleration or deceleration sensor and a fuel level sensor, and the processor activates the fire suppression system according to a condition of acceleration or deceleration indicative of a collision and on a condition of fuel level that is indicative of a fuel spill.

40. The fire suppression system of Claim 26, wherein the instrument comprises an acceleration or deceleration sensor and a fire sensor, and the processor activates the fire suppression system according to a condition of acceleration or deceleration indicative of a collision and a condition of fire being detected.

41. A method for suppressing vehicle fires, comprising:
activating a fire suppression system according to at least one condition selected from the group consisting of acceleration, deceleration, speed, time, temperature, fuel, fuel level, fire, smoke, light transmittance and optical signature, and wherein the fire suppression system comprises the fire extinguisher of Claim 1.

42. The method of Claim 41, further comprising:
activating the fire suppression system after expiration of a time period on a condition of acceleration or deceleration that is indicative of a collision.

43. The method of Claim 41, further comprising:

activating the fire suppression system on a condition of acceleration or deceleration that is indicative of a collision and on a condition of temperature that is indicative of a fire.

44. The method of Claim 41, further comprising:

activating the fire suppression system on a condition of acceleration or deceleration that is indicative of a collision and on a condition of smoke that is indicative of a fire.

45. The method of Claim 41, further comprising:

activating the fire suppression system on a condition of acceleration or deceleration that is indicative of a collision and on a condition of speed that is indicative of the vehicle slowing down.

46. The method of Claim 41, further comprising:

activating the fire suppression system on a condition of acceleration or deceleration that is indicative of a collision and on a condition of speed that is indicative of the vehicle stopping.

47. The method of Claim 41, further comprising:

aborting the fire suppression system so as not to activate even if one or more instruments are indicating a condition that would otherwise cause activation.

48. The method of Claim 41, further comprising:

activating the fire suppression system with a manual activate switch even if the instruments are indicating a condition that would otherwise not cause activation.

49. The method of Claim 41, further comprising:

activating the fire suppression system on any two conditions selected from the group consisting of acceleration, deceleration, temperature, speed, smoke, fuel level, fuel, time and fire.

50. The method of Claim 41, further comprising:

activating the fire suppression system on a condition of acceleration or deceleration and on a condition of speed and on a condition of time, provided the vehicle has reached a minimum speed condition and the time delay after an acceleration or deceleration condition indicative of a collision is adjusted according to the speed that is in excess of the minimum speed at the time of collision.

51. The method of Claim 41, further comprising:

activating the fire suppression system on a condition of acceleration or deceleration indicative of a collision and on a condition of fuel being detected that is indicative of a fuel spill.

52. The method of Claim 41, further comprising:

activating the fire suppression system on a condition of acceleration or deceleration indicative of a collision and on a condition of fuel level that is indicative of a fuel spill.

53. The method of Claim 41, further comprising:

activating the fire suppression system on a condition of acceleration or deceleration indicative of a collision and on a condition of fire being detected.

54. A fire suppression system for a vehicle, comprising:

a solid propellant fire extinguisher;

an instrument capable of indicating a condition selected from the group consisting of acceleration, deceleration, speed, time, temperature, fuel, fuel level, fire, smoke, light transmittance and optical signature; and

a processor to activate the fire extinguisher based on an indication of one or more conditions.